Viewpoint: Regulators should embrace the Vatican's decade-old endorsement of GMOs

Ten years ago this week, I was privileged to join a small group of scholars and clergy convened, from around the world by the Pontifical Academy of Sciences for a "study week," the subject of which was, "Transgenic Plants for Food Security in the Context of Development."

As directed by Pope Benedict XVI, its purpose was "to evaluate benefits and risks of genetic engineering [GE] and of other agricultural practices on the basis of present scientific knowledge and of its potential for applications to improve food security and human welfare worldwide in the context of a sustainable development."

The result was, especially for the time, a rare, constructive melding of science, technology, religion, and humanistic principles.

The summary document from the study week began by reaffirming and summarizing an earlier Pontifical Academy of Sciences analysis, "The Use of 'Genetically Modified Food Plants' to Combat Hunger in the World," prepared in 2000 but not published until 2004. Its conclusions, which were quite progressive for the time, included:

> More than 1 billion of the world population of 6.8 billion people are currently undernourished, a condition that urgently requires the development of new agricultural systems and technologies.
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> Agriculture as currently practiced is unsustainable, evidenced by the massive loss of topsoil and unacceptably high applications of pesticides throughout most of the world.
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> The appropriate application of GE [Genetic Engineering] and other modern molecular techniques in agriculture is contributing toward addressing some of these challenges.
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> There is nothing intrinsic about the use of GE technologies for crop improvement that would cause the plants themselves or the resulting food products to be unsafe.
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> The scientific community should be responsible for research and development (R&D) leading to advances in agricultural productivity, and should also endeavor to see that the benefits associated with such advances accrue to the benefit of the poor as well as to those in developed countries who currently enjoy relatively high standards of living.

The 2009 study week expanded on those observations, concluding, in part:

 GE technology, used appropriately and responsibly, can in many circumstances make essential contributions to agricultural productivity by crop improvement, including enhancing crop yields and nutritional quality, and increasing resistance to pests, as well as improving tolerance to drought and other forms of environmental stress. These improvements are needed around the world to help improve the sustainability and productivity of agriculture.

The genetic improvement of crop and ornamental plants represents a long and seamless continuum of progressively more precise and predictable techniques. As the U.S. National Research Council concluded in a 1989 report: ‘As the molecular methods are more specific, users of these methods will be more certain about the traits they introduce into the plants and hence less liable to produce untoward effects than other methods of plant breeding.’

The benefits have already been of major significance in countries such as the U.S., Argentina, India, China and Brazil, where GE crops are widely grown. [During the decade since the publication of the study week summary, the benefits have arguably increased from ‘major significance’ to monumental, as described in many published analyses by British economists Graham Brookes and Peter Barfoot.]

They also can be of major significance for resource-poor farmers and vulnerable members of poor farming communities, especially women and children. Insect-resistant GE cotton and maize, in particular, have greatly reduced insecticide use (and hence enhanced farm safety) and contributed to substantially higher yields, higher household income and lower poverty rates (and also fewer poisonings with chemical pesticides) in specific small-farm sectors of several developing countries, including India, China, South Africa and the Philippines.

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The introduction of resistance to environmentally benign, inexpensive herbicides in maize, soybean, canola, and other crops is the most widely used GE trait. It has increased yields per hectare, replaced back-breaking manual weeding, and has facilitated lower input resulting in minimum tillage (no till) techniques that have lowered the rate of soil erosion. This technology could be especially useful to farmers in the developing world who, for reasons of age or disease, cannot engage in traditional manual weed control.

GE technology can combat nutritional deficiencies through modification that provides essential micro-nutrients. For example, studies of provitamin A-biofortified ‘Golden Rice’ have shown that standard daily diets containing this biofortified rice would be sufficient to prevent vitamin A deficiency.

The application of GE technology to insect resistance has led to a reduction in the use of chemical insecticides, lowering the cost of some agricultural inputs and improving the health of agricultural workers. This relationship is particularly important in areas such as many European nations, where applications of insecticides are much higher than in most other regions, which may damage ecosystems generally as well as human health.

GE technology has already raised crop yields of poor farmers and there is evidence of its generating increased income and employment that would not otherwise have taken place.

Costly regulatory oversight of GE technology needs to become scientifically defensible and risk-based. This means that regulation should be based upon the particular traits of a new plant variety rather than the technological means used to produce it.

Risk assessments must consider not only the potential risks of the use of a new plant variety, but also the risks of alternatives if that particular variety is not made available.

Significant public-sector efforts are currently underway to produce genetically improved varieties or lines of cassava, sweet potatoes, rice, maize, bananas, sorghum, and other major tropical crops that will be of direct benefit to the poor. These efforts should be strongly encouraged.

The magnitude of the challenges facing the world's poor and undernourished must be addressed as a matter of urgency. Every year nutritional deficiencies cause preventable illness and death. The recent rise in food prices throughout the world has revealed the vulnerability of the poor to competition for resources. In this context, forgone benefits are lost forever.

Given these scientific findings, there is a moral imperative to make the benefits of GE technology available on a larger scale to poor and vulnerable populations who want them and on terms that will enable them to raise their standards of living, improve their health and protect their environments.

The recommendations in the Pontifical Academy's summary statement were equally constructive and important:

Enhance the provision of reliable information to regulators, farmers and producers around the world so that they will be enabled to make sound

> decisions based on up-to-date information and knowledge about all aspects of farm management for productivity and sustainability.

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> Standardize – and rationalize – the principles involved in the evaluation and approval of new crop varieties (whether produced by so-called conventional, marker assisted breeding, or GE technologies) universally so that they are scientific, risk-based, predictable and transparent. It is critical that the scope of what is subject to case-by-case review is as important as the actual review itself; it must also be scientific and risk-based.

> Re-evaluate the application of the precautionary principle to agriculture, reframing it scientifically and practically and making the regulatory requirements and procedures proportional to the risk, and considering the risks associated with lack of action.

The statement went so far as to instruct those who misapply the precautionary principle that “prudence (*phronesis* or *prudentia*) is the practical wisdom that should guide action,” and that “the main component of prudence is not precaution but prediction. This means that the primary feature of prudence is not refraining from acting to avoid harm but using scientific prediction as a basis for action.”

The conclusions and recommendations of the Pontifical Academy of Sciences have been independently arrived at, reiterated, and endorsed by other scientific bodies but have largely been ignored by policymakers. Unscientific, excessive, dysfunctional regulation has limited biotechnology’s benefits to only a small fraction of their potential. Entire once-promising *sectors* — including genetically engineered animals, biopharming, and bioremediation – have been decimated.

If only legislators and regulators would “get religion,” and take the Pontifical Academy’s decade-old recommendations to heart.

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